

STEREO MOC Status Report  
Time Period: 2014:293 - 2014:299

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 296, during the DSS-43 support, turbo decoder lock was lost intermittently between 2005z and 2013z. The anomaly resulted in the loss of 315 frames of data. During this time, DSN reported fluctuating receiver, SNR and SNT readings. Coincidentally, transmitter drive on occurred at 2005z. See DR #C110651 for more information.
- On day 297, no real-time science telemetry was downlinked as the scheduled 70 meter support with DSS-14 was changed to a 34 meter support with DSS-55 in support of the STEREO Behind communication recovery.
- On day 298, no real-time science telemetry was downlinked as the scheduled 70 meter support with DSS-14 was changed to a 34 meter support with DSS-55 in support of the STEREO Behind communication recovery.
- On day 299, no real-time science telemetry was downlinked as the scheduled 70 meter support with DSS-14 was changed to a 34 meter support with DSS-55 in support of the STEREO Behind communication recovery.

2. The following spacecraft/instrument events occurred during this week. Note that the Ahead observatory is operating on the first side lobe of the HGA to prevent overheating of the HGA feed assembly.

- On day 293, DHS release 1.1.9 was loaded to C&DH RAM and EEPROM. This release contained a RTDFD table correction to ensure that the real-time SWAVES science telemetry continues to be downlinked after a momentum dump during side lobe operations.
- On day 294, MOps macro release 1.1.25 was loaded to C&DH RAM. This release updated the SSR playback ratio from 2 to 3 for spacecraft playbacks during side lobe operations.

- On day 295, Fault Protection release 2.3.16 was loaded to C&DH RAM and EEPROM. This release contained an enhancement rule to conserve IMU lifetime by powering off the IMU after 2 hours if the star tracker is on-line and a change to protect against simultaneous star tracker and IMU anomalies.
- The average daily science data return for Ahead, while operating on the first side lobe on the HGA, was 31 Mbits during this week.

STEREO Behind (STB) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 297, NASA Science Mission Directorate was briefed by GSFC and JHU/APL on the Behind loss of communications anomaly. A Failure Review Board will be convened by GSFC to understand the failure and ensure that the Ahead observatory is protected against a similar anomaly.

2. Detailed status of the activities that occurred this week on the Behind loss of communication anomaly, which occurred on day 274, are listed below. The project has requested 3 hour 70 meter DSN supports every 21 hours through day 313 to re-establish communications. This ensures that communications on an LGA will be attempted daily.

- On days 293 through 299, during the DSN 70 meter support each day, contingency commanding continued with ensuring that IMU-A is disabled as it has failed. No signal was received by the DSN radio science receivers.

Significant findings to date:

1. Analysis of the three DSN extracted telemetry frames from the carrier signal just before the planned observatory reset/anomaly occurred on October 1<sup>st</sup>, showed nominal performance of the spacecraft, i.e., no anomalies, IMU off, and the star tracker providing an attitude solution.
2. Post reset, from the very limited telemetry, three packets, extracted from the carrier signal by the DSN, the X-axis gyro on IMU-A had failed. Unfortunately, this telemetry contained only G&C anomaly data and no spacecraft summary

data, i.e., the state of the RF, G&C, fault protection and other subsystems is not known at the time of the anomaly. With a failed IMU and the star tracker being off-line for an undetermined duration, the sun sensors will keep the observatory pointed at the Sun, though the G&C will not have any roll knowledge, and cannot roll the observatory as part of the safing configuration to re-establish communications on the LGAs. From analysis of this telemetry, it is highly suspected that the observatory is rotating due to an autonomous momentum dump initiated by bad gyro data flagged good, but this has not yet been confirmed.

3. At least two anomalies occurred post reset, the star tracker not promoting to AAD mode and the X-axis gyro failure. Unfortunately, due to the number of possible combinations, the STEREO fault protection system is not designed for simultaneous failures.

The cause and effect analysis of the loss of communications from the LGAs is continuing. G&C simulations using the bad gyro data flagged good are continuing to better understand the potential impact to the observatory state. Recovery from a negative power state is also being investigated.

Once communications are restored and the anomaly resolved, the operational plan for exiting the solar conjunction testing will continue to return the BEHIND observatory back to nominal science data collection as soon as safely possible.